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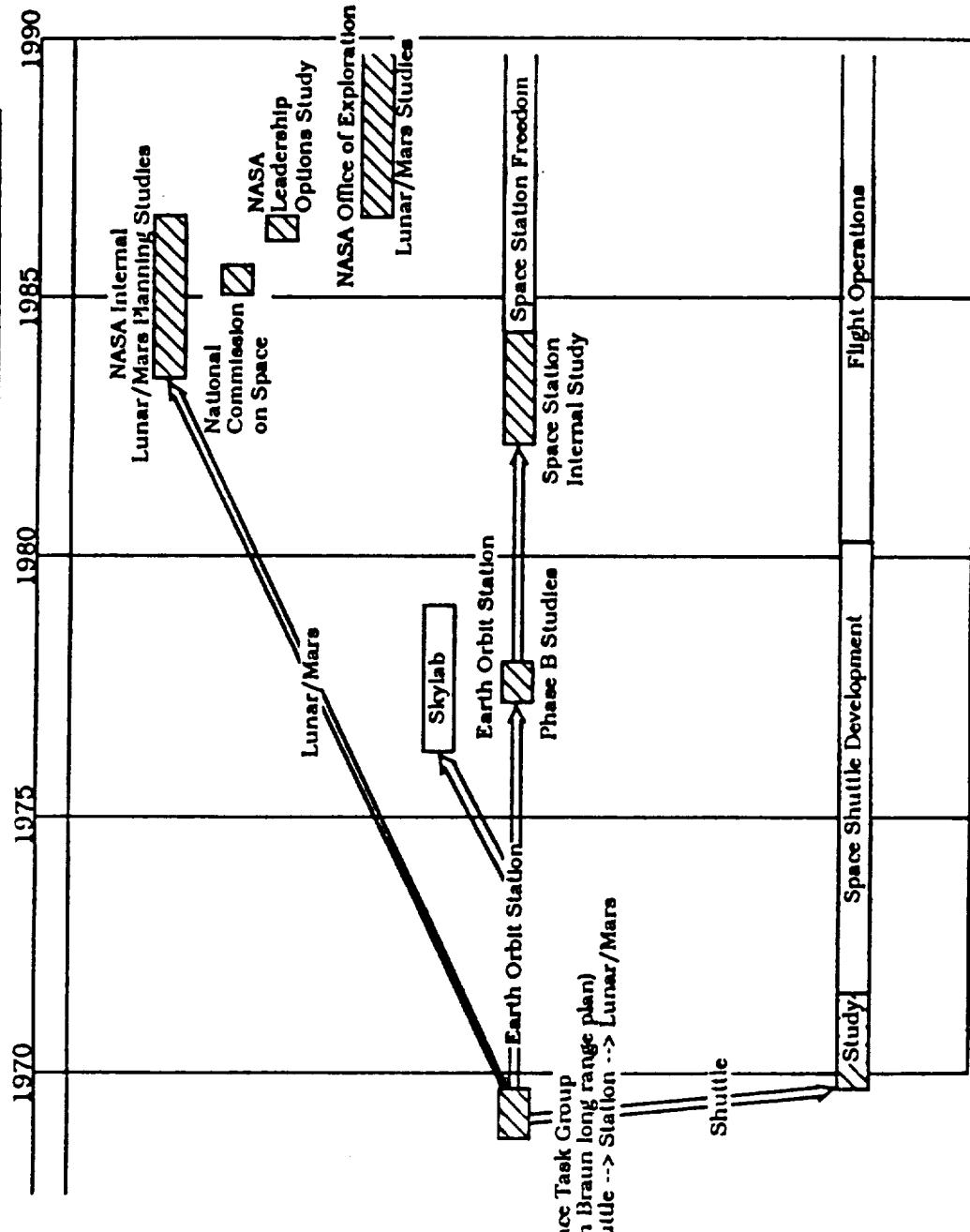
PRESENTATION 1.7

N91-17027

EXPLORATION INITIATIVES

NASA Exploration Initiative

POST-Apollo Manned Spaceflight Thrusts



Technical Study Group

PRESIDENT BUSH

JULY 20, 1989

THE GOAL: "... TO ESTABLISH THE UNITED STATES AS THE PREEMINENT SPACE FARING NATION."

THE COMMITMENT: "... A SUSTAINED PROGRAM OF MANNED EXPLORATION OF THE SOLAR SYSTEM . . . AND THE PERMANENT SETTLEMENT OF SPACE."

THE PLAN: "FIRST . . . FOR THE 1990'S . . . SPACE STATION FREEDOM . . .
AND NEXT - FOR THE NEW CENTURY - BACK TO THE MOON.
AND THIS TIME BACK TO STAY.

AND THEN - A JOURNEY TO ANOTHER PLANET - A MANNED MISSION TO MARS.

EACH MISSION . . . WILL LAY THE GROUNDWORK FOR THE NEXT."

THE ACTION: "... VICE PRESIDENT . . . TO LEAD THE NATIONAL SPACE COUNCIL IN DETERMINING SPECIFICALLY WHAT'S NEEDED . . .

- MONEY, MANPOWER, AND MATERIAL . . .
- FEASIBILITY OF INTERNATIONAL COOPERATION . . .
- REALISTIC TIMETABLES, MILESTONES . . .
- . . . REPORT BACK AS SOON AS POSSIBLE WITH CONCRETE RECOMMENDATIONS"

NASA Exploration Initiative

PRE-JULY 20, 1989 STUDIES

PATHWAYS

- Moon only-science
- Moon only-oasis
- Mars only
- Phobos --> Mars
- Moon --> Mars

MAJOR VARIABLES EXAMINED

- Launch vehicle size vs. In-space assembly vs. direct to surface
- SSF vs. new spaceport vs. direct assembly
- Spaceport in lunar orbit
- Various Mars trajectories: sprint, split/sprint, opposition, conjunction, Venus assist
- Chemical vs. electric vs. nuclear vs. unconventional propulsion
- Aerobraking vs. all-propulsive vehicles
- Expeditions vs. evolution
- Expendable vs. reusable spacecraft
- Propellant transfer vs. tank transfer
- Open vs. closed life support
- Zero-g vs. artificial-g Mars vehicle
- In-situ resources vs. Earth-supplied

POST-JULY 20, 1989 STUDIES

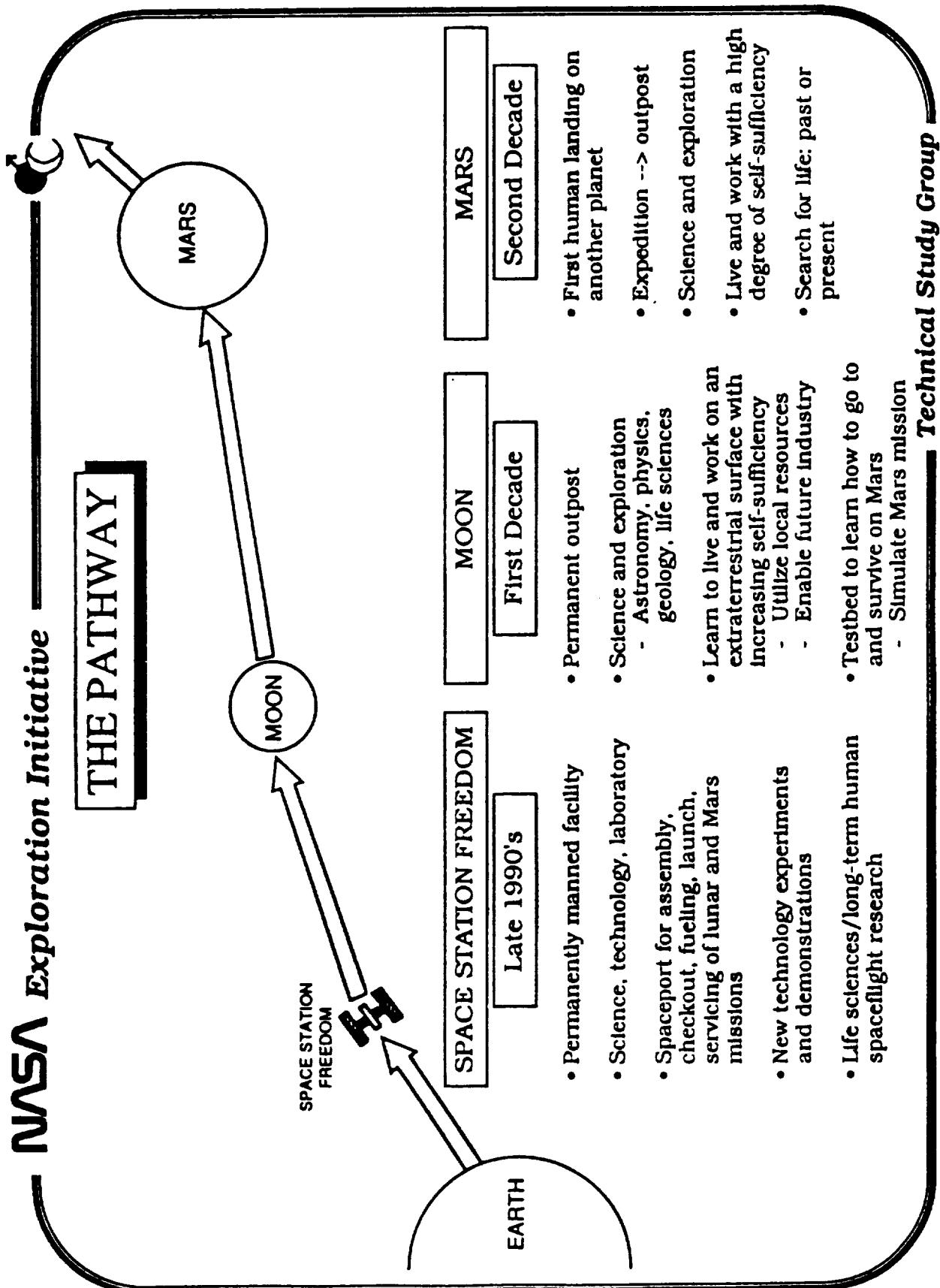
PATHWAY SET:

- SSF --> Moon --> Mars

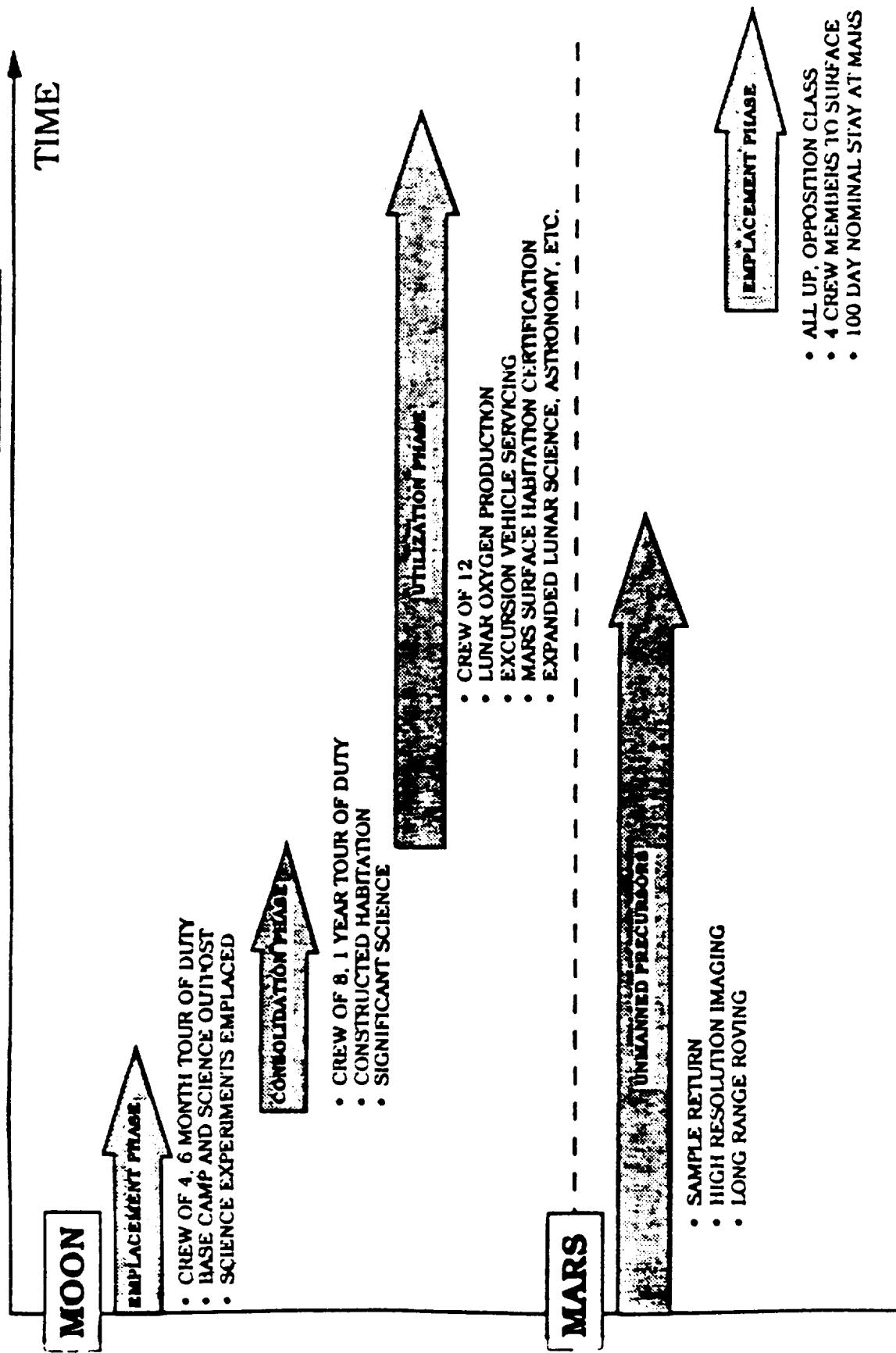
MAJOR QUESTIONS

- Scale of program
- Program schedule
- Lunar emphasis
- Technology level
- Cost

NASA Exploration Initiative

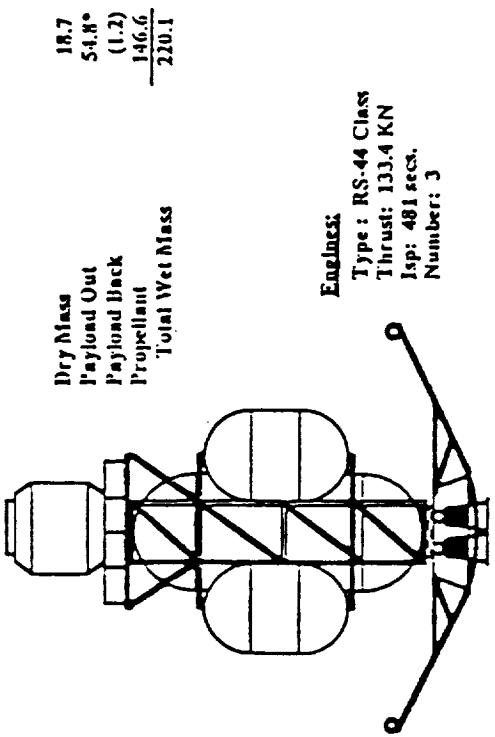


A POSSIBLE MISSION SCENARIO BASED ON EVOLUTIONARY APPROACH



LUNAR TRANSPORTATION VEHICLES
2003 - 2005

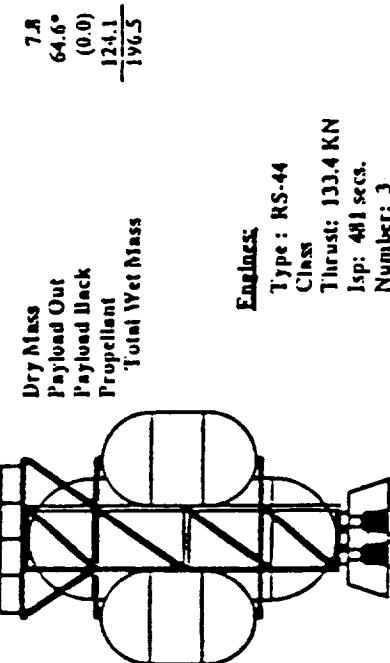
LUNAR TRANSFER VEHICLE



Engines:

Type : RS-44 Class
Thrust: 133.4 KN
Isp: 461 secs.
Number: 3

PILOTTED CONFIGURATION



Engines:

Type : RS-44 Class
Thrust: 133.4 KN
Isp: 461 secs.
Number: 3

CARGO CONFIGURATION

LUNAR EXCURSION VEHICLE



Dry Mass

Payload Out

Payload Back

Propellant

Total Wet Mass

Engines:

Type : RS-44 Class
Thrust: 266.9 KN
Isp: 465 secs.
Number: 4

PILOTTED CONFIGURATION



Dry Mass

Payload Down

Payload Up

Propellant

Total Wet Mass

Engines:

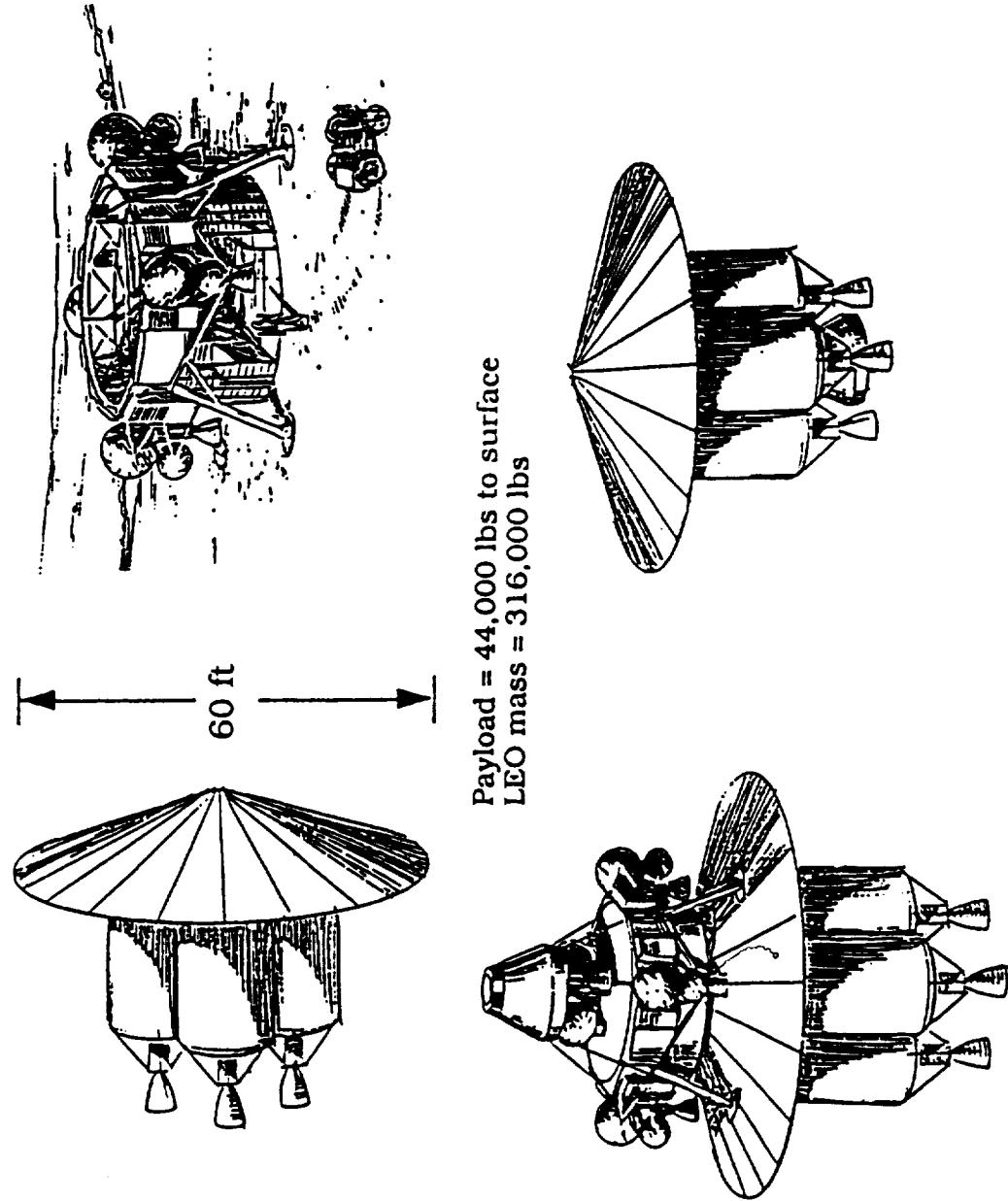
Type : RS-44 Class
Thrust: 266.9 KN
Isp: 465 secs.
Number: 4

CARGO CONFIGURATION

- * Payload out includes wet excursion vehicle and payload

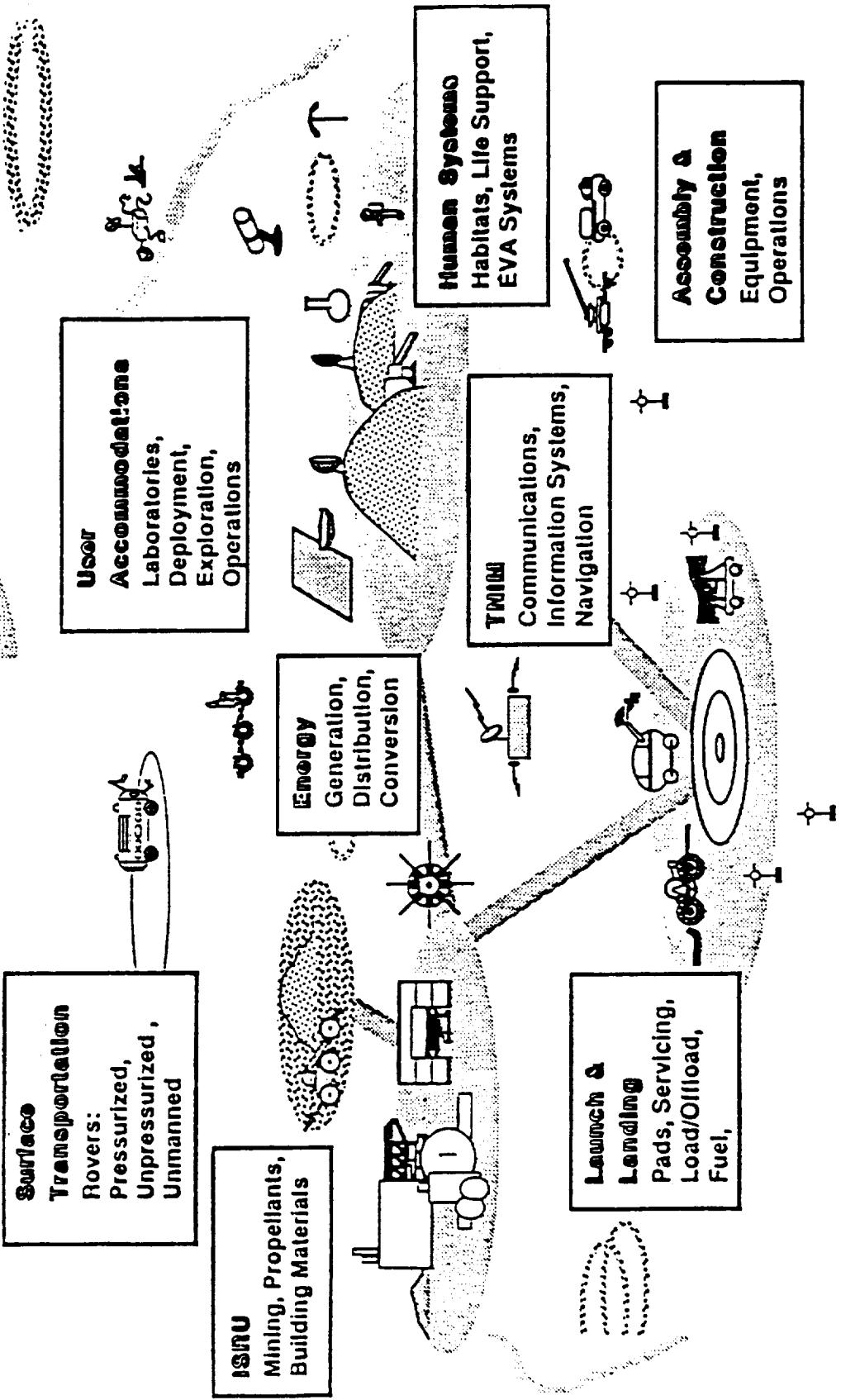
NASA

LUNAR TRANSFER, DESCENT, AND ASCENT VEHICLES

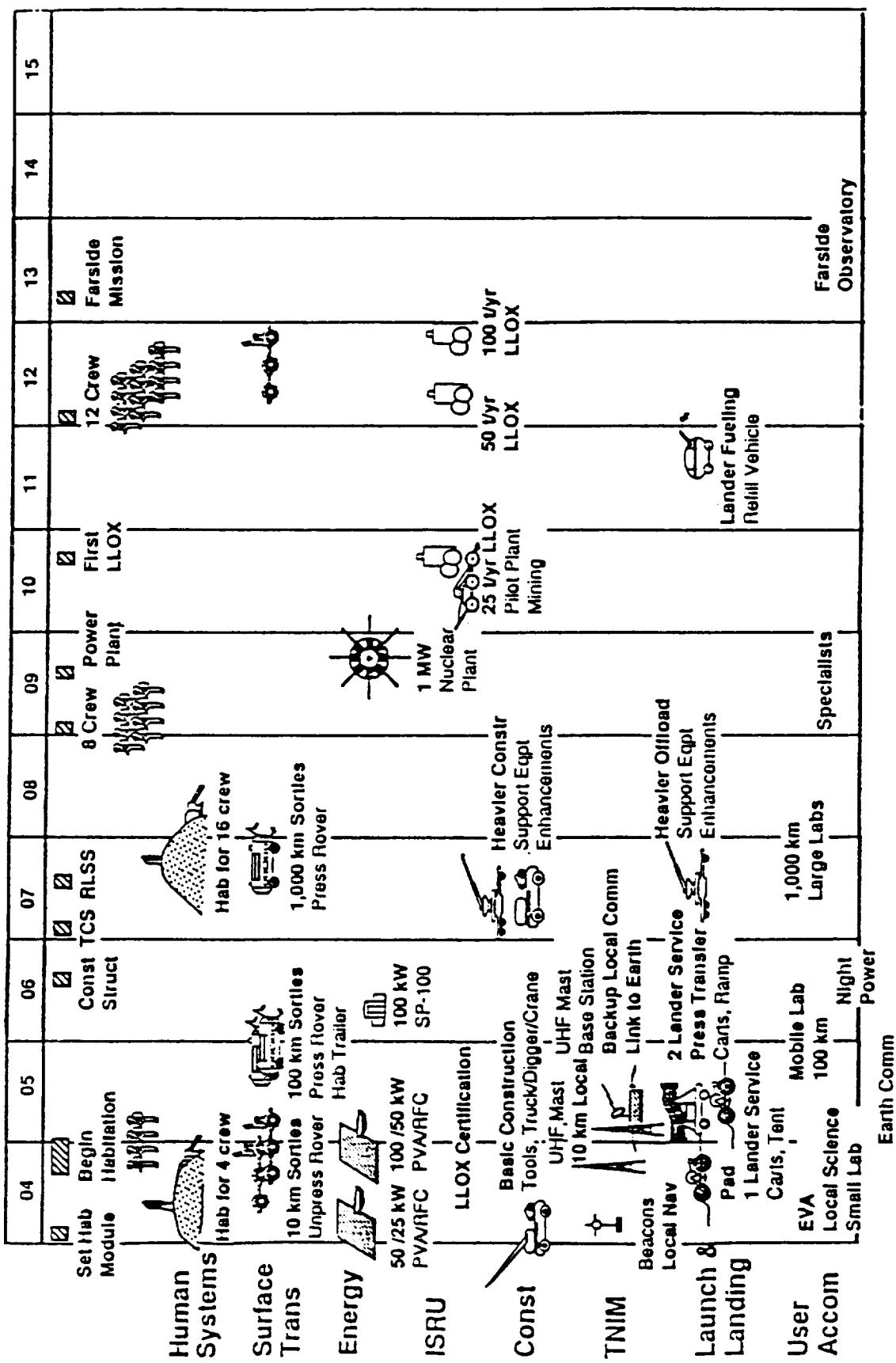


Office of Exploration

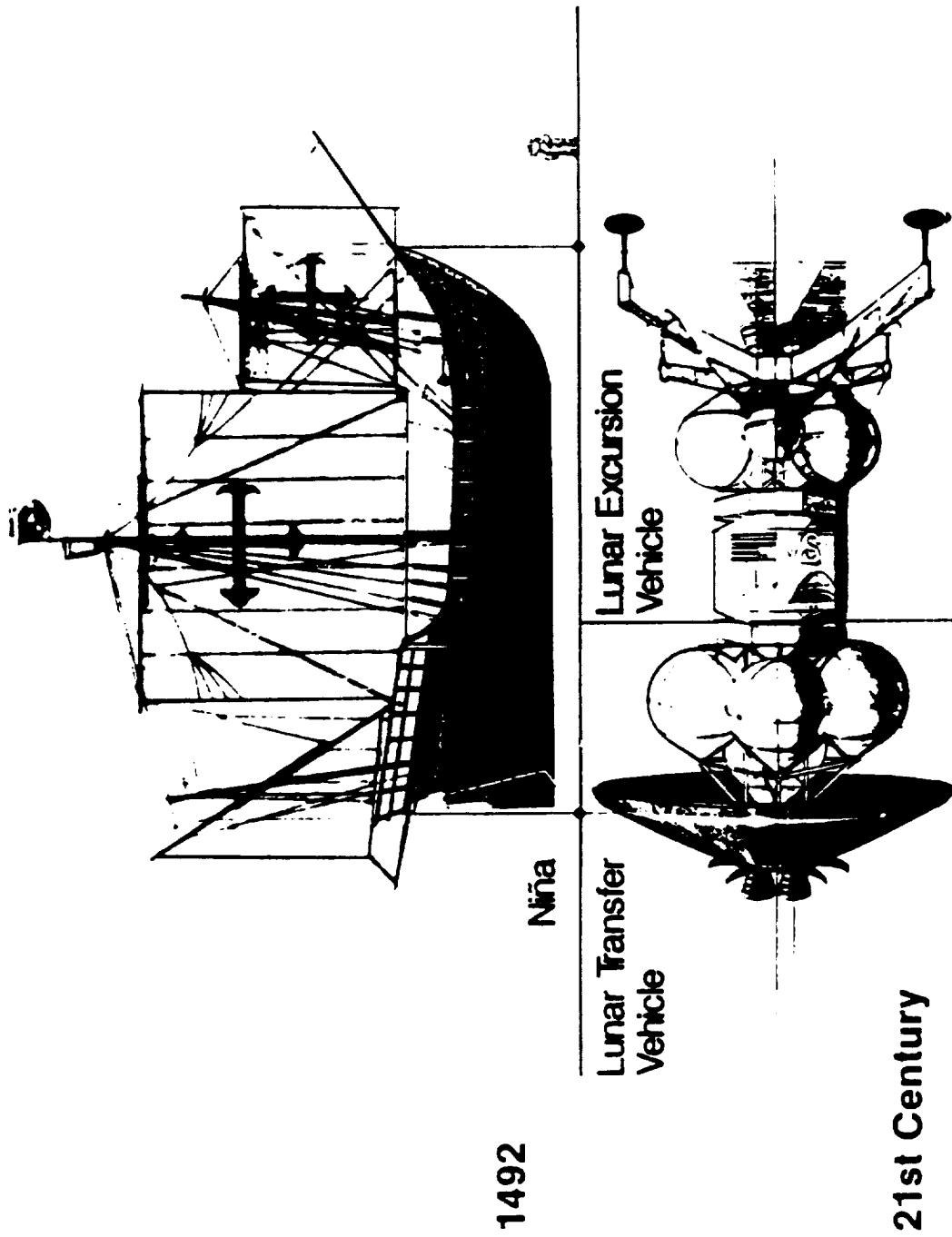
Surface Systems Function Areas



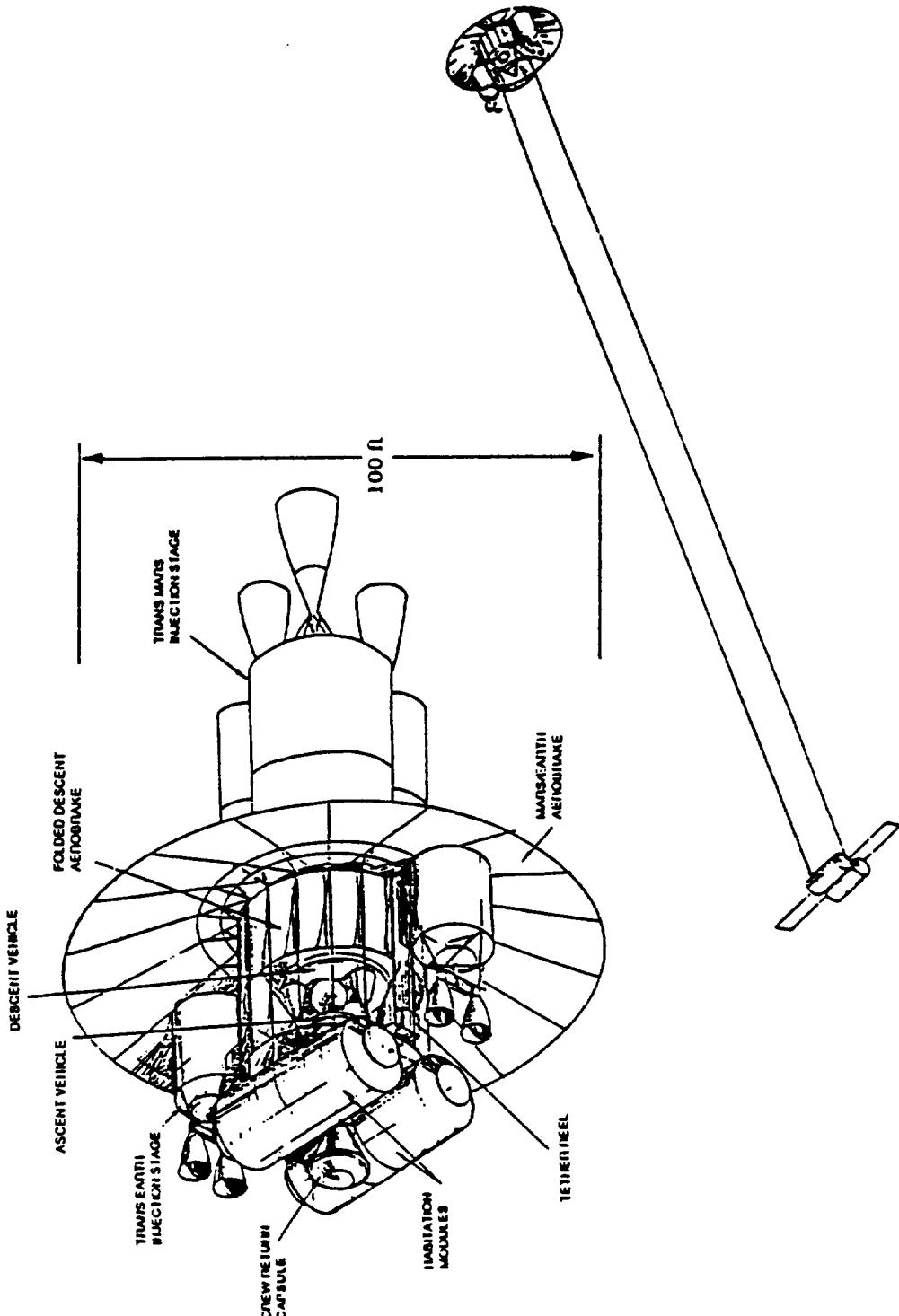
Lunar Evolution Summary



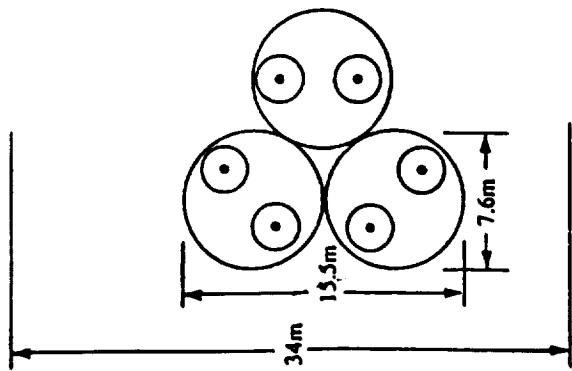
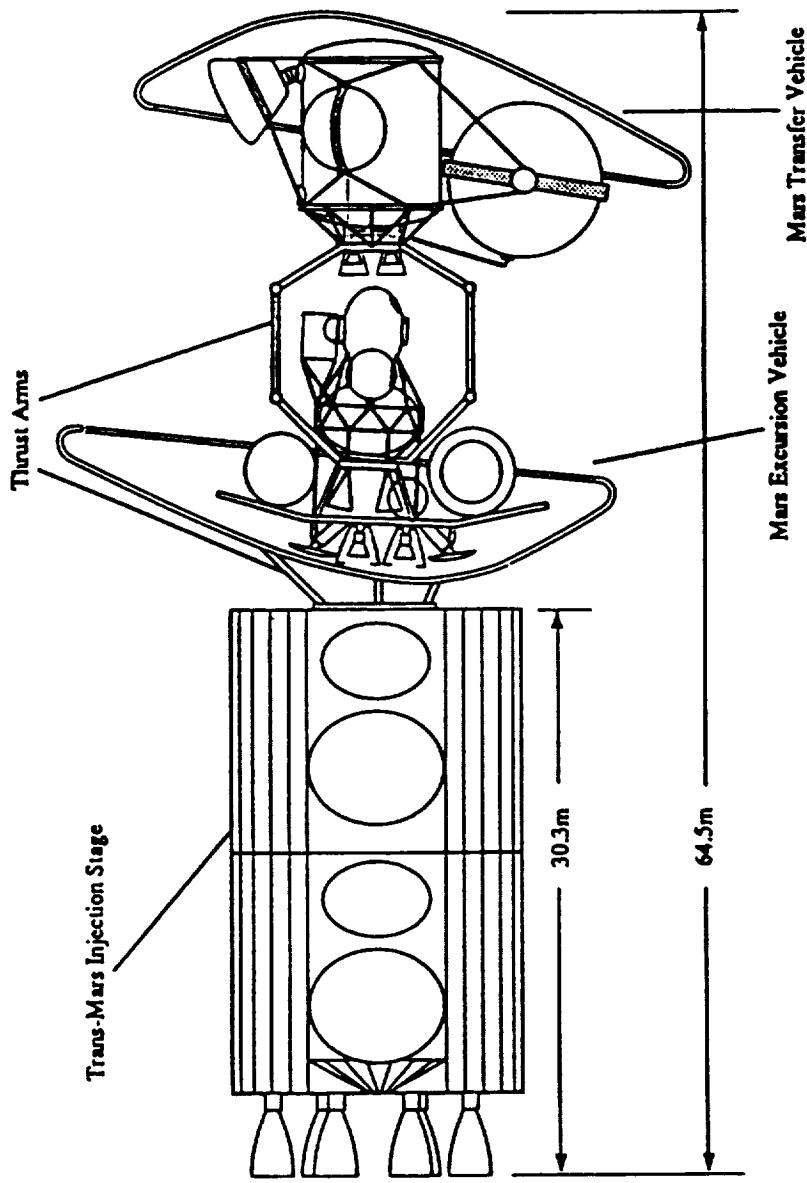
Ships of Exploration



MARS SPACECRAFT

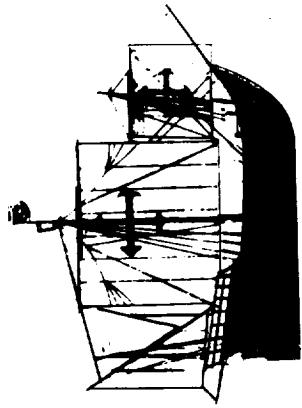


Full-up Mars Mission Vehicle in LEO



MTV	203.7t
MEV	81.6t
TMIS	526.4t
<hr/>	
Total IMEO	811.7t

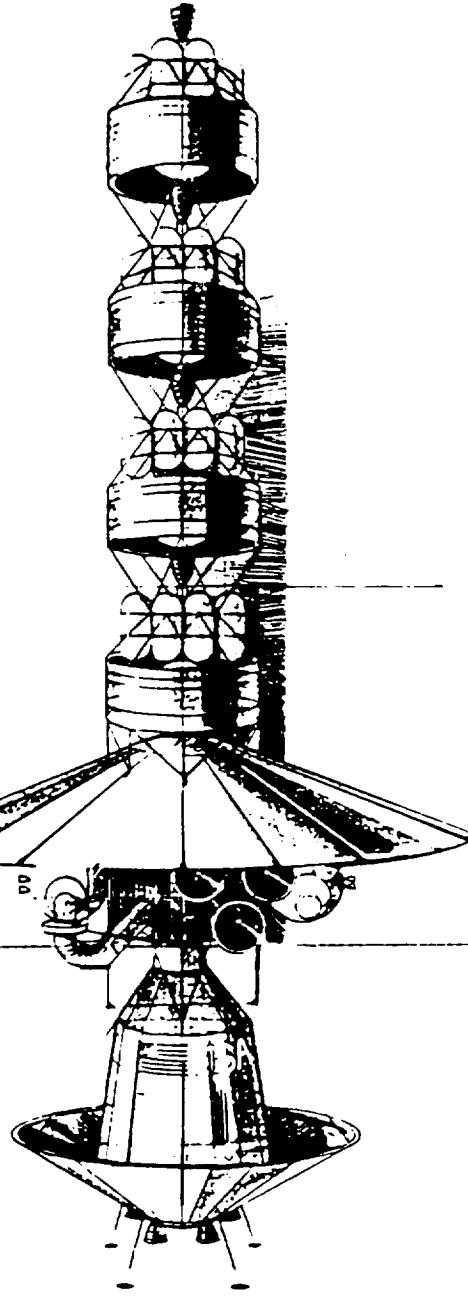
Ships of Exploration



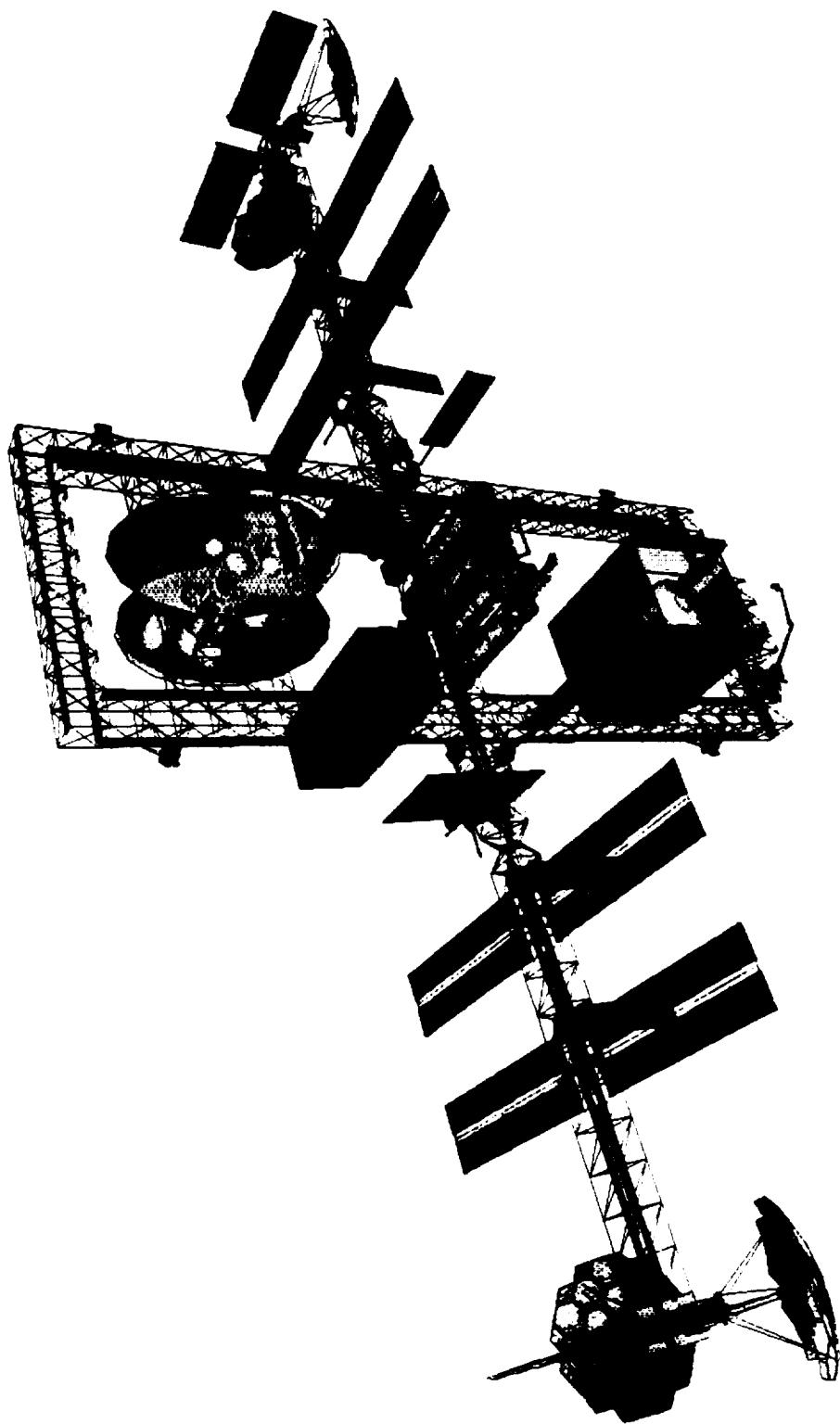
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Mars Excursion Vehicle Mars Transfer Vehicle 21st Century

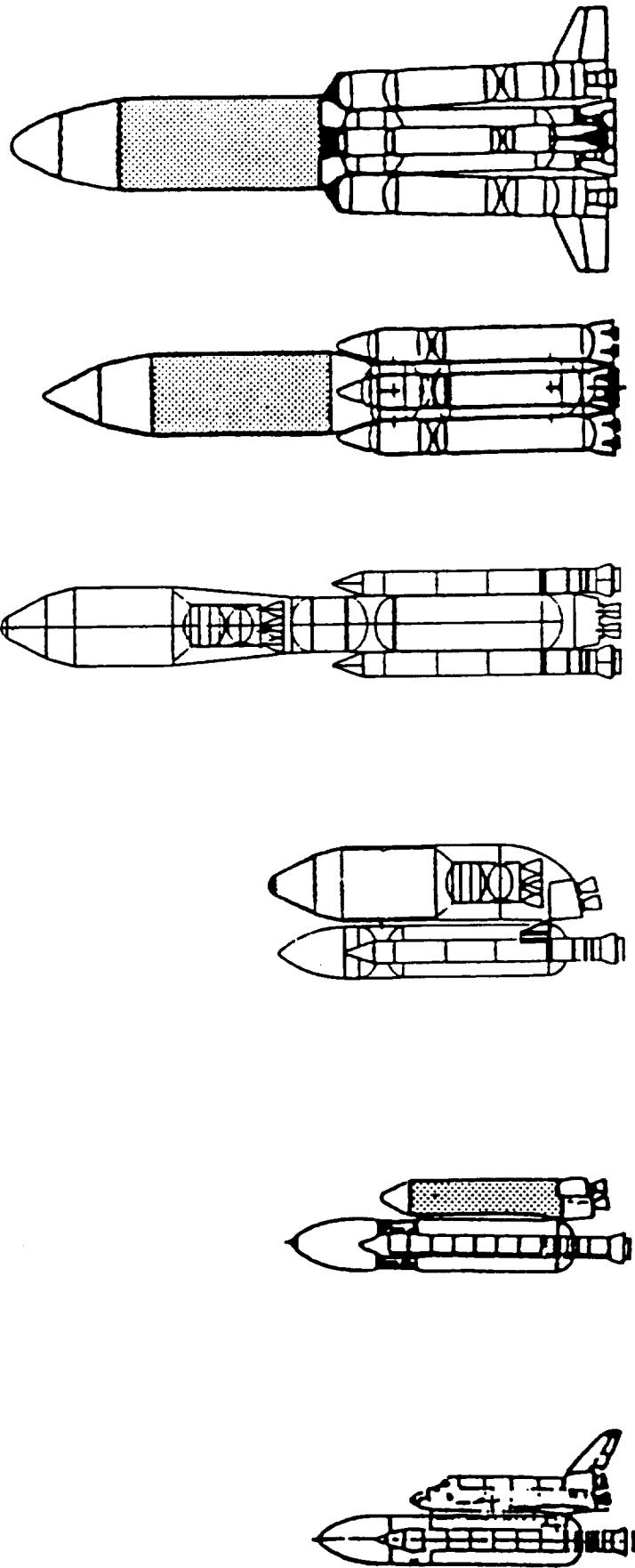


LUNAR/MARS TRANSPORTATION NODE



LARC SSFO

SHUTTLE - DERIVED LAUNCH VEHICLES



STS	SIDEMOUNT	INLINE	INLINE	BIGGER CORE
SHUTTLE C	SIDEMOUNT	THIRD STAGE	LIQUID STRAPONS	
SHUTTLE Z	SIDEMOUNT	THIRD STAGE	MORE ASRMs	
SHUTTLE - DERIVED VEHICLES				

Lunar/Mars Space Transportation Systems Technology/Advanced Development

- Most Critical Areas of Technology/Advanced Development

Lunar

- Aerobrake

Mars

- Space Transfer Engine
- Cryogenic Storage and Transfer

- Cryogenic Aux. Propulsion
- Lightweight Aerobrakes
- Cryogenic Storage Transfer
- On-Orbit Assy & Veh Process.
- Space Transfer/Landing Engines
- ECLSS for Long-Duration Missions
- Alternate Propulsion Technology
 - Nuclear Thermal/Solar Electric